

Appln No.: 09/874,137
Amdt. dated July 6, 2004
Reply to Office action dated Feb. 5, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Currently Amended): A silent chain for reducing wear on a chain guide surface, the chain comprising:

a plurality of link plates each having a pair of tooth parts and pin holes, the link plates arranged in a thickness direction as well as in a length direction, adjacent link plates rotatably linked together using linking pins;

guide links each having a pair of pin holes, the guide links disposed on outermost sides of the link plates and fixed to the linking pins at their pin holes;

wherein a clearance is provided between the link plate pin holes and the linking pins therein, a first distance from a the pin hole centerline of each said link plate to a link plate surface facing the chain guide is greater than a second distance from a pin hole centerline of each said guide link to a guide link surface facing the chain guide when in engagement with the chain guide, and the link plate pin hole clearance and ratio of the first distance to the second distance is effective to prevent substantial contact between the guide link surfaces and the chain guide surface when the chain engages the chain guide.

Claim 2 (Canceled).

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Claim 3 (Previously Amended): A silent chain according to Claim 1, wherein said guide link comprises a low rigidity guide link having a crotch part created in the surface facing the chain guide.

Claim 4 (Previously Amended): A silent chain according to Claim 1, wherein said link plate is a rear-driven link plate having a pair of tooth parts on either side of a pin hole centerline.

Claim 5 (Previously Amended): A silent chain according to Claim 1, wherein surfaces at shoulder parts of said guide link on the chain guide side do not protrude beyond shoulder parts of the link plate on the chain guide side while in contact with the guiding surface of the chain guide.

Claim 6 (Currently Amended): A silent chain for reducing wear on a chain guide surface, the chain comprising:

a plurality of link plates each having at least one pair of tooth parts and a pin hole, one tooth part of each pair above and the other below a pin hole centerline, the link plates arranged in a thickness direction as well as in a length direction, adjacent link plates rotatably linked together using linking pins,

guide links disposed on outermost sides of the link plates and fixed to the linking pins,

wherein a clearance is provided between the link plate pin holes and the linking

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pins therein such that a first distance from the pin hole centerline of each link plate to the distal surface of the tooth part facing the chain guide is less than a second distance from the pin hole centerline of each guide link to a guide link surface facing the chain guide, the link plate pin hole clearance and ratio of the first distance to the second distance is effective to prevent substantial abrasive contact between the tooth part distal surfaces and the chain guide when the chain engages the chain guide.

Claim 7 (Previously Cancelled).

Claim 8 (Cancelled).

Claim 9 (Original): A silent chain according to Claim 6, wherein the guide link comprises a low rigidity guide link having a crotch part created in the surface facing the chain guide.

Claim 10 (Original): A silent chain according to Claim 6, wherein surfaces at shoulder parts of the guide link on the chain guide side protrude beyond shoulder parts of the link plate on the chain guide side while in contact with the guiding surface of the chain guide.

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Claim 11 (Currently Amended): A silent chain having a plurality of links for reducing wear on a chain guide surface when the chain runs thereover, the chain comprising:

a plurality of guide plates having a pair of apertures therethrough for generally fixedly receiving pins to define links, the guide plates having a contact surface;

a plurality of link plates having a pair of apertures therethrough for pivotally receiving the pins to interconnect the links, the link plates having a contact surface with an area smaller than the surface area of the guide plate contact surface;

the guide plate apertures and the link plate apertures relatively positioned to generally maintain the guide plate contact surface in contact with the chain guide surface and the link plate contact surfaces spaced from the chain guide surface to reduce wear on the chain guide surface.

Claim 12 (Currently Amended): A silent chain having a plurality of links for reducing wear on a chain guide surface when the chain runs thereover, the chain comprising:

a plurality of guide plates having a pair of apertures therethrough for generally fixedly receiving pins to define links, the guide plates having a contact surface;

a plurality of link plates having a pair of apertures therethrough for pivotally receiving the pins to interconnect the links, the link plates having a contact surface;

the guide plate apertures and the ~~guide~~ link plate apertures relatively positioned to generally maintain the link plate contact surface in contact with the chain guide

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surface and the guide plate contact surface spaced a distance from and out of substantial contact with the chain guide surface when the chain is engaged on the chain guide surface to reduce wear on the contact surface.

Claim 13 (Original): A silent chain according to Claim 12, wherein the guide plate contact surface comprises a plurality of teeth.

Claim 14 (Previously Amended): A silent chain for reducing wear on a chain guide surface, the chain comprising:

a plurality of link plates each having a pair of tooth parts and pin holes, the link plates arranged in a thickness direction as well as in a length direction, adjacent link plates rotatably linked together using linking pins;

guide links each having a pair of pin holes disposed on outermost sides of the link plates and fixed to the linking pins;

wherein a first distance from a pin hole centerline of each link plate to a link plate surface facing the chain guide is greater than a second distance from a pin hole centerline of each guide link to a guide link surface facing the chain guide, the ratio of the first distance to the second distance effective to prevent substantial contact between the guide link surfaces and the chain guide surface when the chain engages the chain guide; and

the guide link pin holes have a diameter ϕD_g , the link plate pin holes have a diameter ϕD_l , the pins have a diameter ϕd , the link plate first distance is h_l , the guide

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link second distance is h_g , and the distance between the guide link surfaces and the chain guide is e ; the relationship between the link plate pin holes and e is expressed by the formula $e = \frac{1}{2} (\phi_{DI} - \phi_d)$; and $h_l - h_g$ is greater than or equal to e .

Claim 15 (Original): A silent chain according to Claim 14, wherein the guide link pin hole diameter ϕ_{Dg} is substantially the same as the pin diameter ϕ_d , and the ratio of the guide link distance h_g to the link pin hole diameter ϕ_{DI} is sufficient to permit the rotation of the link plates about the pins while preventing substantial contact between the guide link surfaces and the chain guide surfaces when the chain engages the chain guide.

Claim 16 (Original): A silent chain according to Claim 6, wherein the guide link pin holes have a diameter ϕ_{Dg} , the link plate pin holes have a diameter ϕ_{DI} , the pins have a diameter ϕ_d , the link plate first distance is h_l , the guide link second distance is h_g , and the distance between the link plate surfaces and the chain guide is e ; the relationship between the link plate pin holes and e is expressed by the formula $e = \frac{1}{2} (\phi_{DI} - \phi_d)$; and $h_g - h_l$ is greater than or equal to e .

Claim 17 (Original): A silent chain according to Claim 16, wherein the guide link pin hole diameter ϕ_{Dg} is substantially the same as the pin diameter ϕ_d , and the ratio of the guide link distance h_g to the link pin hole diameter ϕ_{DI} is sufficient to permit the rotation of the link plates about the pins while preventing substantial contact between

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the link plate teeth and the chain guide surfaces when the chain engages the chain guide.

Claim 18 (New): A silent chain according to claim 12, wherein the guide plate contact surfaces face the chain guide surface.

Claim 19 (New): A silent chain having a plurality of links for reducing wear on a chain guide surface when the chain runs thereover, the chain comprising:

a plurality of guide plates having a pair of apertures therethrough for generally fixedly receiving pins to define links, the guide plates having a contact surface;

a plurality of link plates having a pair of apertures therethrough for pivotally receiving the pins to interconnect the links, the link plates having a contact surface with an area smaller than the surface area of the guide contact surface;

the guide plate apertures and the link plate apertures relatively positioned to generally maintain the guide plate contact surface in contact with the chain guide surface and the link plate contact surfaces spaced from the chain guide surface to reduce wear on the chain guide surface, wherein half of a clearance distance between the pin hole of said link plate and the linking pin in addition to a distance from a pin hole centerline of said guide link to guide link surface facing the chain guide is less than or equal to a distance from a pin hole centerline of the link plate to a link plate surface facing the chain guide.

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Claim 20 (New): A silent chain for reducing wear on a chain guide surface, the chain comprising:

a plurality of link plates each having a pair of tooth parts and pin holes, the link plates arranged in a thickness direction as well as in a length direction, adjacent link plates rotatably linked together using linking pins;

guide links each having a pair of pin holes, the guide links disposed on outermost sides of the link plates and fixed to the linking pins at their pin holes;

wherein a first distance from a pin hole centerline of each said link plate to a link plate surface facing the chain guide is greater than a second distance from a pin hole centerline of each said guide link to a guide link surface facing the chain guide when in engagement with the chain guide, the ratio of the first distance to the second distance effective to prevent substantial contact between the guide link surfaces and the chain guide surface when the chain engages the chain guide, wherein half of a clearance distance between the pin hole of said link plate and the linking pin in addition to a distance from a pin hole centerline of said guide link to guide link surface facing the chain guide is less than or equal to a distance from a pin hole centerline of the link plate to a link plate surface facing the chain guide.

Claim 21 (New): A silent chain for reducing wear on a chain guide surface, the chain comprising:

a plurality of link plates each having at least one pair of tooth parts and a pin hole, one tooth part of each pair above and the other below a pin hole centerline, the

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link plates arranged in a thickness direction as well as in a length direction, adjacent link plates rotatably linked together using linking pins,

guide links disposed on outermost sides of the link plates and fixed to the linking pins,

wherein a first distance from the pin hole centerline of each link plate to the distal surface of the tooth part facing the chain guide is less than a second distance from the pin hole centerline of each guide link to a guide link surface facing the chain guide, the ratio of the first distance to the second distance is effective to prevent substantial contact between the tooth part distal surfaces and the chain guide when the chain engages the chain guide, and wherein half of a clearance distance between the pin hole of the link plate and the linking pin in addition to a distance from a pin hole centerline of the link plate to a link plate surface facing the chain guide is less than or equal to a distance from a pin hole centerline of the guide link to guide link surface facing the chain guide.